

No. 7 — *Zoological Results of a Fifth Expedition to East Africa*

VII

Itinerary and Conclusions

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INTRODUCTION

In the summer of 1948 the author, financed by grants from the Museum of Comparative Zoology and Penrose Fund of the American Philosophical Society, proceeded to Nyasaland to investigate the dwindling fauna of its surviving montane forests.

No adequate appraisal of the present situation is possible without giving some consideration to the human factors involved. During the journey from Tete that, on September 16, 1859, culminated in David Livingstone's discovery of Lake Nyasa, he encountered innumerable burnt-out villages and reported that intertribal conflicts and raids by Arab slavers were affairs of almost daily occurrence.

One consequence of these conditions was that the more peaceful agriculturists, seeking refuge from the aggressive warrior tribes, fled to the mountains where they made clearings in the forests for cultivation. The ceaseless demand for fresh land that characterizes the shifting agriculture practiced by Africans, eventually resulted in the destruction of the forest.

However, not agriculturists but alien pastoralists were the chief offenders. In November, 1835, the Ngoni, retreating northwards from their Zulu kinsmen, crossed the Zambezi near Tete and, under the leadership of Zongandaba, headed towards Lake Tanganyika subjugating or massacring the tribes encountered en route. Many Ngoni settled in the highlands west of Lake Nyasa in what is now known as Angoniland. There, to provide grazing for the cattle they had captured, they destroyed vast tracts of forest. The results of this

prodigality are being reaped today in the form of erosion¹, drought and desiccation.

Intertribal fighting, slave-raiding, famine, pestilence, and preventable diseases which had been acting as checks on the growth of population, have largely ceased to operate since May 14, 1891, when Great Britain declared a Protectorate over Nyasaland, a country but little larger than the State of Indiana. Ten years later a census showed that in 1901 the indigenous population numbered 736,724

1911	"	"	"	"	969,183
1921	"	"	"	"	1,199,934
1931	"	"	"	"	1,599,988
1945 ²	"	"	"	"	2,044,707

Such increases in an agricultural population lead to continuous demands on land. Surreptitious inroads on the more remote forests are still being made despite the efforts of the Forestry Department; the latter would require a much larger staff if adequate protection is to be accorded the widely scattered Forestry Reserves.

"Nearly the whole of Nyasaland has at one time been covered with forest . . . the greater security of the last thirty or forty years has accelerated the process of forest destruction . . . Virgin forest is mostly limited to areas unsuitable for cultivation or remote from water." So wrote Murray (1932, pp. 305-327) from whom I have culled the information contained in the following paragraph.

TROPICAL RAIN FOREST no longer exists, but *Chlorophora excelsa*, *Erithoplacum guineense* and *Syzigium guineense* may represent survivals.

EVERGREEN BROAD-LEAFED FOREST persists in many gullies, and as true forest in the ravines and on the plateaus of high mountains like Mlanje, Cholo, Nchisi and the Vipya range. The total area probably does not exceed twenty square miles if North Nyasa is excluded. There, in the Misuku Mountains, larger strips are reported. This high forest has close canopy, together with woody lianas, epiphytic ferns, moss, lichen, orchids, much undergrowth and deep humus soil.

¹ No estimate of its extent is known to me, but Thomson King (1953, "Water: Miracle of Nature") states that the rivers of the United States are annually depositing 780 million tons of topsoil in the surrounding oceans. Assuming this estimate to be correct and other factors equal, then Nyasaland may be losing something like 10 million tons of soil a year, the area of Nyasaland being roughly about a 78th that of the Continental United States.

² In 1941 no census was taken on account of World War II.

EVERGREEN CONIFER FOREST. A patch of Kenya Pencil Cedar (*Juniperus procera*) still exists on the Nyika Plateau, the most southerly place in its range. Mlanje Cypress (*Widdringtonia whytei*) and *Podocarpus milanjensis* survive in the ravines, valleys and plateaus of Mlanje Mountain between 4000 and 7000 feet.

Shortly after the publication of my (1933, pp. 27-43) zoogeographical conclusions regarding the surviving montane forests just across Nyasaland's northern frontiers, R. E. Moreau's (1933, pp. 415-435) much more comprehensive paper appeared. In his discussion of "Pleistocene Climatic Changes and the Distribution of Life in East Africa," Moreau concludes that *continuous* evergreen forest may well have persisted to a much later date than that which I had cautiously suggested. He points out that after the Kamasian epoch in which the great West African forest was continuous with the present "forest islands" of the East, interruption apparently resulted from adversely dry conditions supervening.

In recent years geological research in East Africa has unquestionably established the occurrence, in late Tertiary times, of three pluvial periods, the first of which was the heaviest. During these times of greater precipitation the forest sheet may have been established all the way from Elgon through Kilimanjaro to the Usambaras on the East Coast as recently as 12,000 years ago. Moreau then considered it less likely that the connection extended to the Ulugurus or that that range was linked by forest with the mountains immediately north of Nyasaland. Thus conditions favorable for subspecific differentiation have only existed for a period of about 12,000 years. Moreau also considers that if a general increase of from 15 to 20 inches of rainfall occurred throughout East Africa, this would be adequate, in time, to reestablish forest over the greater part of the country — assuming, of course, no interference by man. For human agency, quite as much as a diminishing rainfall, is responsible for the present situation as regards forests.

As is now generally recognized, the fauna adapted to life in the cool and damp conditions prevailing in montane primary forests, cannot long survive the destruction of its habitat. Grass, scrub and secondary growth spring up in abandoned areas, into which moves the widespread savanna fauna of the surrounding region. It was in the hope of ascertaining how much of Nyasaland's primary forest fauna survived, that this expedition to the Protectorate was undertaken July 17, 1948 to April 17, 1949.

1948 ITINERARY

BEIRA, MOZAMBIQUE. 19°49' S., 34°50' E. Alt. *circa* 25 feet.

Docked on Saturday, July 17; entrained for Blantyre on the 19th.

As my time was occupied by customs clearance, arranging railway accommodation and consigning baggage, only two afternoons were available for collecting and little was obtained besides some lizards and a snake. This was disappointing as Beira is type locality for *Bufo taitanus beirae* and *Rana ruddi*, besides some birds and mammals.

BLANTYRE, NYASALAND. 15°48' S., 35°00' E. Alt. 3500 feet.

Arrived July 20, and left by lorry on the 26th.

Temperatures range from 50° to 96°, while the annual rainfall averages 59 inches. This occurs between November and April with the heaviest down-pours in February and March. In July it was dry and dusty.

Blantyre, the earliest settlement in the Shire Highlands, is a small but thriving township situated in undulating country. Avenues of *Eucalyptus* line the roads and many other introduced trees and ornamental shrubs are to be seen in the gardens. On the surrounding hills is much open *Brachystegia* woodland except where cleared for native plots. Some surviving forest flanks the Mudi River where it flows along below the Golf Course.

As, during our stay, I was engaged in opening crates of equipment and stores, repacking them in more manageable loads, engaging natives, and making other preparations for *ulendo*, no collecting was attempted. A local naturalist, Mr. B. L. Mitchell, donated the few specimens recorded as from Blantyre. Blantyre is type locality for a green snake (*Chlorophis shirana* = *Philothamnus i. irregularis*) and a shrew (*Crocidura occidentalis hera*), both of which I subsequently obtained at Cholo, just 26 miles away.

LIKABULA RIVER, foot of MLANJE MTN. 15°55' S., 35°40' E. Alt. 2100 feet.

Arrived in afternoon of July 27, and left at 10.15 A.M. on August 7.

During our ten-day stay it often clouded over, accompanied by a sharp drop in temperature; however, rain fell only on three or four occasions and then chiefly at night though once it continued until noon.

Our tents were pitched on the hillside about a hundred yards from the river and the Forestry Depot to which timber is brought down daily from Chambe Plateau. Situated at the end of a motorable track, the Depot is also at the junction of the trails leading to both Chambe and Lichenya Plateaus. Another reason for its selection as

our first camp was due to the Vernay Expedition's report that it was a good locality for reptiles, besides being as good as any other place in which to train skinners on common savanna mammals before going up the mountain.

Mr. F. H. France, the Forestry Officer in charge of the Depot, informed me there was good evidence to show that the whole area was heavily forested about 2000 years ago. Today the surrounding slopes supported only *Brachystegia* orchard forest and a scattering of *Uapaca* trees among which a rank growth of dry grass rose to heights that varied with the degree of erosion on the hillsides. Much larger trees and a dense tangle of thorny undergrowth grew among the jumble of great boulders that flank the moderate-sized river, whose rock-girt bed indicated that its flow was formerly much greater; probably still is during the monsoon rains.

Despite our visit coinciding with the dry season, frog collecting got off to an auspicious start with Mrs. Loveridge collecting *Arthroleptis boulengeri* and *Rana ansorgii*, two species entirely new to Nyasaland. Four other kinds of amphibia taken in the same patch of marshy ground represented species or races that had not been recorded previously under their correct names.

Also new to the Protectorate was a Greater Plated-Lizard (*Gerrhosaurus m. grandis*), but like the dozen other forms of reptile life taken at Likabula, all were of common, widespread, savanna types.

Best of the birds was a Cuckoo-Falcon (*Aviceda c. verreauxi*), a hawk with which I was previously unacquainted. However, except in the immediate vicinity of the river and the Frances' garden, bird life was astonishingly scarce, the dry woodland still and lifeless in the heat.

By a curious coincidence the most abundant mammal, consequently the species on which the skinners were trained, was apparently an undescribed race of fat-mouse and has been called *Steatomys p. nyasae* with Likabula River as type locality. Other than rodents, mammals appeared uncommon. An elephant-shrew (*Rhynchocyon c. cirnei*) was brought in by a native, the only example of the typical form we were destined to get during the entire trip. Spoor of leopard, civet and mongoose was present on the paths and an occasional baboon or blue-monkey seen along the river.

LICHENYA PLATEAU, MLANJE MTN. 16°02' S., 35°33' E. Alt. 6000 feet.

Arrived August 7, and left with carriers at 3.30 P.M. on the 23rd.

From the 7th to the 15th the weather remained fine except for a tendency to cloud over in the afternoons. On the night of the 15th a biting gale arose,

and torrential rain fell from about noon on the 16th till the following morning when it changed to a fine white mist that blotted out the landscape, visibility being restricted to from 50 feet to 50 yards as the wraiths of wet white mist blew about. June to September being the coldest months, reptiles were quiescent.

In view of the weather conditions we were very fortunate in being offered the use of "Araloon" cottage by its owner, Mr. A. R. Westrop of Cholo, whose kindness was much appreciated. This cottage was conveniently situated in relation to the surviving patches of evergreen forest.

Most of the forests consisted of Mlanje Cypress (*Widdringtonia whytei*) that was, except for recent plantations, chiefly confined to sheltered ravines and the main valley bottoms, but copse-like stands survived on the undulating, wind-swept moorland whose tussocky grass was studded with everlasting flowers. Here and there was a scattering of scorched *Protcas*, persisting despite the annual grass-burning of which the most recent had swept much of the Lichenya just a fortnight before our arrival on the Plateau. The grass-burning is initiated and supervised by the Forestry Department to prevent further destruction of the frequently-bracken-surrounded patches of forest. Relatively few of the trees are over thirty feet in height, but the majority are heavily coated with moss and lichen while many display waving tresses of *Usnea*. Unfortunately these forest patches are well-nigh impenetrable on account of the dense undergrowth, but digging in the rich loam about the buttress roots of the larger trees or under logs lying at the forest fringe gave little evidence that they harbored any of the reptile forms characteristic of the tropical forests nearer to the equator.

Within the forest only two species of amphibia were encountered. At this season Whyte's Frogs (*Arthroleptis s. whytii*) were found hibernating in moss, in rotten wood on the trees, or in the soil among their roots. A very few were found associated with Ansorge's Frogs (*Rana ansorgii*) in a rivulet meandering through a small patch of woodland. The *Rana*, like other members of the genus taken on the plateau, is more properly a moorland species.

Apart from some semi-hibernating snakes (*Psammophylax t. variabilis*), of which we secured topotypes, the only active reptiles seen were skinks. One, the common *Mabuya v. varia*, the other a race (*M. bocagii mlanjensis*) of a species new to Nyasaland, but the Vernay Expedition, which stayed at Forestry Cottage (24.vi.-18.vii.46),

collected a small skink (*Scelotes arnoldi*) previously known only from Selinda Mountain in Southern Rhodesia, and a solitary pygmy chameleon (*Brookesia p. carri*) that was described as new because it differs somewhat from the typical form inhabiting Mlanje's lower slopes.

The avifauna of Lichenya Plateau has been dealt with in a paper by Belcher, more recently by Vincent (1933) who raised to 50 the number of recorded species. It is type locality for at least a dozen races of passerine birds but I collected topotypes of only four.

Mammals larger than rodents, of which we secured topotypes of *Praomys j. delectorum* and *Rhabdomys p. nyasae*, were decidedly scarce. Blue monkeys (*Cercopithecus m. nyasae*), much harassed by man and leopards, kept to the denser interiors of the larger forest but I managed to get one. Another topotype was a rock hyrax (*Heterohyrax s. manningi*) obtained on nearby Chambe Plateau. Of the race of blue duiker (*Cephalophus c. nyasae*) described from Mlanje I found only slots; klipspringers are said to occur on the rocky heights; bushbuck were present and wild pig may have been common in places.

CHAMBE PLATEAU, MLANJE MTN.

Visited on August 20th in search of hyrax, which we found in the fine forest; returned to Lichenya the same day, a walk of about 21 miles in all.

CHIRADZULU MOUNTAIN. 15°40' S., 35°00' E. Alt. 3900 feet.

Arrived August 25, and left by lorry on September 1st.

During our six-day stay the weather remained fine. Hot and sunny on the deforested, especially the rock-strewn, slopes; cool and even chilly in forested ravines or shady spots. Except for an occasional shower the chances of rain between July and September are remote.

Mr. C. D. P. T. Haskard, District Commissioner, kindly invited us to be his guests. His house, situated at 3900 feet, is just below the remaining patches of evergreen forest; the summit is 5500 feet.

Perhaps "woodland" would be a more appropriate word than forest, for it is almost entirely composed of a low secondary growth in which few trees exceed a height of more than 20 or 30 feet. These patches are separated by bracken-covered slopes or an orchard growth of the *Brachystegia-Upaca* type. Scattered through the woodland are rocks, some of very large size. A few rivulets furnished the sole evidence of moisture, for deforestation and soil erosion has resulted in most of the streams drying up during the greater part of the year.

It would appear probable that this desiccation is responsible for

the disappearance of at least some of the 14 species of snails described from Chiradzulu. Their dry, and often crumbling shells were found deep in the dusty soil along the shady side of the larger rocks, in the interiors of dead trees, beneath bark and similar situations. Though considerable quantities, representing topotypes of six species, were collected by Mrs. Loveridge, all but half a dozen were dead. Later, five of the missing desiderata were obtained elsewhere.

Amphibia too were scarce, and the five kinds collected in streamlets were of species already met with at Likabula River camp. Similarly all but one of the half-dozen forms of reptiles taken at Chiradzulu were of savanna types, the exception being an arboreal gecko (*Lygodactylus a. angularis*) described from these Shire Highlands. This adaptable lizard now lives on the wall and thatch of the commissioner's house.

The avifauna of Chiradzulu has been comprehensively dealt with in a paper by C. W. Benson who lists 24 species. Needless to say, I saw no sign of the sylvicoline Green-headed Oriole (*Oriolus chlorocephalus*) originally described from Chiradzulu, but of which "few, if any, have been taken in Nyasaland since 1895." I did secure a topotype of a weaver (*Cryptospiza s. australis*) in the savanna scrub.

The native forester informed me that (*Cercopithecus p. whytei*) a non-valid race of monkeys no longer occurs on the mountain but small parties are to be found in the large riverine trees on the plain about five miles away. A spiny mouse (*Acomys scouleri*) was the most interesting rodent trapped during our stay.

ZOMBA PLATEAU, ZOMBA MTN. 15°18' S., 35°17' E. Alt. 5000 (6647) feet.

Arrived late on September 1, and left at 7.30 A.M. on September 13.

On the morning following our arrival we awoke to find visibility restricted to 50 yards, the plateau being enveloped in a damp mist that caused the trees to drip as if it were raining. Similar conditions, accompanied by an inside temperature of 45°, prevailed until the 6th — the first clear dawn. Each morning thereafter the temperature rose slightly but was never above 56°. Official temperatures for the plateau throughout the year, range from 42° to 97°. Though on the 2nd the sun broke through for a time, before noon there began a steady downpour that lasted seven consecutive hours. However, this failed to activate the amphibia as the temperature remained too low.

Through the courtesy of the Nyasaland Government we were allowed to occupy Convalescent Cottage, close to the southern scarp of the plateau and directly above Zomba township which is situated on the lower slopes of the mountain between 2900 and 3100 feet.

Immediately behind the cottage was one of the extensive cedar plantations which are scattered over this section of the 60-square-miles of plateau. In this vicinity little, if any, original forest remains, apart from some gallery forest along the banks of the Mlungusi (Mulungusi) River whose numerous small falls are often set in sylvan surroundings of considerable beauty. In ravines and sheltered spots to the west, dense woodlands of small size provide refuge for survivors of the forest fauna, most of the plateau consisting of rolling grasslands.

Caecilians have been taken on the plateau, after rain, by Mitchell, but of the 10 species of frogs occurring there only one is a forest form, the rest being widespread upland or savanna types.

Of the score of lizards recorded from Zomba Plateau or township, only the arboreal *Lygodactylus a. angularis* and *Holaspis g. laevis* can lay any claim to be considered species of the primary forest, and both of them display considerable adaptability to savanna conditions. Of the 21 species of snakes taken on Zomba all but three are lowland savanna types; the exceptions (*Pseudaspis cana*, *Duberria l. shiranum* and *Psammodromus t. variabilis*) are, in East Africa, montane-meadow forms.

Though 15 kinds of birds were preserved from the Plateau, I failed to procure topotypes of any of the dozen species described from Zomba — unless one includes the beautiful plantain-eater (*Tauraco l. livingstonii*) whose type locality is Manganja at the south end of the plateau.

Of the 9 mammals described from Zomba only two, a dormouse (*Claviglis johnstoni*) and a thicket rat (*Thamnomys s. surdaster*) were collected. Indeed, apart from rodents and bats of which we preserved a dozen species, mammals were scarce, bushbuck being the only ungulates seen during our eleven days on the plateau.

Numerous invertebrates, including some of the eight snails which have "Zomba Plateau at 5000 feet" as type locality, were preserved, and two kinds of local crabs were found by Dr. Fenner Chase to represent undescribed species of which they became paratypes.

DEDZA, DEDZA DISTRICT. 14°05' S., 34°07' E. Alt. 4900 feet.

Arrived September 13 and left on 14th. Arrived December 21 and left on 22nd.

In September, 1930, the temperature fell to 32°, but the usual averages range from about 42° to 95°. The annual average rainfall in Dedza is only 42".

Dedza Mountain is 7000 feet above sea level, Chongoni nearly 8000

feet. Being informed there was little, if any, primary forest left on either of these mountains we did not visit them. Such little collecting as we accomplished was carried out in the swamp a mile below the Angoni Highlands Hotel, where we put up for the night after long days on the road.

KASUNGU BOMA, KASUNGU DISTRICT. 13°03' S., 33°28' E. Alt. 3100 feet.

Arrived September 14 and left on 15th. Arrived November 24 and left on 25th. The Vernay Expedition stayed from August 18 to 23, 1946.

Temperatures in the district range from 50° to 84°, accompanied by an annual average rainfall of 28 inches.

In so dry a region water is something of a problem; consequently our tents were pitched near the administrative buildings on ground that has since been built over. Kasungu village lies about 60 miles west of Lake Nyasa in rather flat, scrub-covered country, with scattered hills here and there.

Apparently the herpetofauna of Kasungu would well repay investigation. During their brief stay the Vernay party collected a short-limbed skink (*Riopa m. modesta*), and just as we were leaving, Mrs. Loveridge caught a fine specimen of a handsome sand-lizard (*Ichnotropis capensis*); neither species had ever been taken in Nyasaland before.

MZIMBA, MOMBERA DISTRICT. 11°52' S., 33°35' E. Alt. 4500 feet.

Arrived September 15 and left on 16th. Arrived November 23 and left on 24th.

Temperatures average about 67° over the year, and the annual rainfall is around 33 inches.

Mzimba, 414 miles north of Blantyre on the mainroad to Tanganyika, is provincial headquarters for the Mombera district and a town of some size. The district covers 3200 square miles of eroded, undulating, wind-swept uplands at altitudes that are mostly between 3500 and 5000 feet. Both going to, and returning from, the North Nyasa district we put up at the excellent Government Rest House. Little collecting was done.

VIPYA PLATEAU, MOMBERA DISTRICT. Alt. 6000 feet.

Arrived September 16 and left on 20th.

Temperatures are likely to be somewhat lower, and the rainfall higher, than at Mzimba.

Our tents were pitched among a clump of fine trees in a clearing known as Macdonald's Camp. All about was rolling downland covered with dry, waist-high grass and scattered copses composed of trees that had managed to survive the annual encroachment of the periodic grass-burning. Along the marshy bottoms straggled woodland that scarcely merited the name of gully forest despite a few fine trees. Hills and rising ground were stony, their eroded gravel-strewn slopes often almost devoid of vegetation of any kind.

The District Commissioner at Mzimba, Mr. C. W. Benson the well-known ornithologist, warned me that we would find the Vipya Plateau disappointing and suggested our time would be spent to better purpose further north. I had hoped to obtain specimens of the bush-fowl (*Francolinus s. doni*) that Benson had described from this plateau, but though I flushed a covey of three I was not quick enough to get a shot. We did get some elephant shrews, plantain eaters, and a rare limbless lizard (*Melanoseps a. ater*) usually associated with evergreen or gallery forest; our experiences entirely confirmed Benson's views.

We were, of course, camped towards the western side of the vast Vipya Plateau where it rises from the Mombera uplands. I wish it had been possible—but this would have involved a tedious *ulendo* and carriers are exceedingly difficult to enlist for such a purpose—to visit the forest surviving on the deeply fissured eastern side which slopes steeply to the lake shore. Along its northern end the plateau is mountainous and separated by the deep trough of the Henga Valley from the steep-sided Nyika.

KATUMBI, MOMBERA DISTRICT. 10°48' S., 33°32' E. Alt. 4000 feet.

Arrived on the evening of September 20 and left by lorry on the 21st.

Through the courtesy of Mr. Brisley of Mzimba, we received permission to put up for the night in the Rest House of Wenella Labour Camp.

The lynx and other Katumbi skins were donated by Mr. C. W. Benson; we ourselves undertook little or no collecting. Shortly after leaving Katumbi, while driving through the dry orchard woodlands that cover much of the countryside in the vicinity, I shot a pair of bush squirrels (*Paraxerus c. soccatus*) which raced across the road just ahead of us. These were near topotypes, for the form was described from "VWAZA, HEWE RIVER, NORTHERN ANGONILAND." On the Survey Department map of 1942 "Vwasa Marsh" is shown as close to Katumbi where the mainroad leaves Nyasaland for Northern Rhodesia, while "Newe River" appears on Dixey's physical map.

CHINUNKHA, NORTH NYASA DISTRICT. 9°40' S., 33°20' E. Alt. 4300 feet.

Arrived September 21 and left on 22nd. Returned October 18 and left by lorry on the 21st.

On the first occasion we spent the night in the Veterinarian's house. When we came down the mountain we pitched our tents in the nearby clearing of the Native Co-operative Gheery. Chinunkha Village, Chief Nyondo's headquarters, was about a mile away.

In late October a hot wind blew continuously from midday, increasing to gale force after sunset when the heated air rising from the plains resulted in winds rushing down the mountain at whose foot they whirled along, raising straws and leaves in the familiar manner of dust-devils.

Only widespread savanna species were encountered. I had hoped to get examples of the water snake (*Lycodonomorphus r. whytii*) whose alleged type locality — Fort Hill — is only about eight miles away.

MATIPA FOREST, MISUKU MOUNTAINS, NORTH NYASA DISTRICT. Alt. 6000 feet.

Arrived by foot *ulendo* on September 22, left on October 18th.

The climate was by far the most delightful we had encountered so far. The nights were distinctly cool, the early mornings chill but sunny, with temperatures occasionally rising as high as 80° in the afternoon. Very little rain fell during our month's stay at the forest edge.

From Chinunkha a steep climb of from three to four hours via Chief Mwenechiula's huts brought us to the Matipa-Wilindi Ridge, which hardly deserves the name of plateau. Benson regards it as about ten miles east north east of Fort Hill. On July 22, 1896, Alexander Whyte came up from Chirenji, an abandoned mission station, and allegedly reached the mountain four miles east of its highest point. He made camp at the edge of virgin forest in a district locally known as KEKOMBE (a type locality variously spelled KOMBE or KOMBI) The name KOMBE appears to be unknown today, but C. W. Benson tells me that when, as District Commissioner, he visited the mountains, he talked with an old native who recollected a European (undoubtedly Whyte) who came there shooting monkeys in the forest. Benson believes that I camped in substantially the same area as did Whyte — an opinion supported by my securing five of the six vertebrates first discovered by Whyte at Kombe.

The Misuku Mountains were first colonized by Sukwa, "one of the most primitive tribes in Nyasaland, [who] came originally from the hilly areas near Tukuyu in southern Tanganyika. Nomads, they lived mainly on wild berries and fruits, and were so prodigal as to fell trees

in order to obtain the fruit, thus rapidly cutting out the timber and shrubs. Deprived in consequence of an adequate supply of the fruits which were their staple food, they were driven to primitive agriculture." (East Africa & Rhodesia, 19.x.1944, p. 154).

"With the advent of the hoe, incredibly steep hillsides were farmed and massacred. As hillsides thus treated, and valley bottoms in which the tribal cattle lived, were rendered unproductive, villages were compelled to shift to adjacent untouched areas. This was the policy of shifting agriculture . . . With the further addition of cattle as tribal wealth, the damage and erosion on all sides were accelerated, through sheer ignorance on the part of the agriculturist or cattle-owner. By 1937 the plight of the Sukwa, numbering some 2,500 to 3,000 people, with 3,500 to 4,000 head of cattle, had become critical." (Major D. N. Smalley, 1944, Nyasaland Agricultural Quarterly Journal).

The track from Chinunkha wound up through this devastated region and it was good to know that, as a result of the efforts of the Agricultural Department, the destruction had been arrested, not without considerable opposition from the conservative African peasantry who preferred to practice the shifting agriculture of their forefathers involving fresh inroads on the forests.

Matipa Forest, beside which we camped, was unquestionably the finest we met with anywhere in Nyasaland, its fauna and flora more closely resembling those of the equatorial rain forests of Tanganyika Territory. Tree ferns of amazing grace and beauty added to its tropical appearance, and when we entered it as dawn was breaking the pervading stillness was periodically broken by the discordant cries of huge hornbills (*Bycanistes b. brevis*). Lonesome trogons (*Heterotrogon v. vittatus*), with rich metallic-green backs and rose-pink breasts, sat motionless as they whistled softly yet penetratingly for mates. A party of blue monkeys feeding in the canopy far beyond the range of a shotgun, betrayed their presence by dropping discarded fragments which pattered upon the leaf-strewn path that traverses the forest. More rarely our attention would be attracted by the "kuwhek, kuwhek," cry of an orange-red squirrel whose pelage is difficult to detect among the abundant red-brown epiphytic ferns that smother the larger limbs of the great trees. Convenient highways for the squirrels are provided by the tangle of rope-like lianas that festoon, or depend from, most of the trees. Blocks of forest like Matipa and Wilindi are frequently connected by gully growth along the steep-

sided ravines in whose bottoms turbulent little streams foam downwards among the rocks.

Patches of forest were frequently surrounded by extensive belts of well-nigh impenetrable bramble and bracken, the adjacent deforested hillsides, with or without a scattering of stunted xerophytic trees, being under grass. Where this had been burnt off, though the rains were not due for at least a month, the ground was frequently carpeted with short-stemmed, wild flowers — scarlet, purple, blue, yellow, white.

This savanna habitat was faithfully reflected by seven of the eleven forms of amphibia encountered during our stay. Within the forest proper, frogs were extremely scarce and it was only after prolonged and persistent search that a solitary topotype of *Arthroleptis s. whytii* was secured. An abandoned clearing, whose maker had probably been evicted, furnished an exception. There, in marshy ground beside a shallow stream, were many *Phrynobatrachus u. ukingensis* new to Nyasaland. Growing in the marsh were some wild bananas that harbored numerous sedge-frogs (*Hyperolius p. puncticulatus*).

Hitherto no reptiles had the Misuku Mountains for type locality; however we secured several pygmy chameleons (*Brookesia nchisiensis*) and a good series of limbless skinks (*Melanoseps ater misukuensis*), both forms associated with primary forest. Of the snakes three were sylvicoline, an opisthoglyph (*Crotaphopeltis h. tornieri*) and tree-viper (*Atheris n. rungweensis*) had never before been taken in Nyasaland, while a western forest cobra (*Naja melanoleuca*), captured by Mrs. Loveridge, was previously known in Nyasaland from only one or two specimens.

Of the four species of birds collected at Kombe by Whyte, and that were later described as new, I collected *Arizelocichla m. masukuensis*, *Scicereus r. johnstoni* and *Cisticola nigriloris*, the latter of course outside the forest in open grasslands. Whyte was apt to overestimate his altitudes and that of Kombe or Kombi was said to be 7000 feet. My camp was nearer 6000 feet.

Both mammals — *Aethosciurus lueifer* and *Sylvisorex s. sorella* — described from Whyte's Kombe collection were secured, the forest shrew being a diminutive species with excessively long tail. Three rats that we obtained on the Misukus were made paratypes of a new race (*Dasymys i. allenii*); Ilolo on Rungwe Mountain being selected as the type locality.

CHERE RIVER BRIDGE, NORTHERN RHODESIA. $10^{\circ}45' \text{ S.}, 33^{\circ}30' \text{ E.}$ Alt. 4000 feet.
Arrived about noon October 21, and left very early on the 22nd.

Stayed the night in the Public Works' Department Rest House beside the bridge. This was situated in arid, recently burnt-over and still smouldering, woodland on the Northern Rhodesian side of the border, the only one in which we did any collecting. The principal acquisitions during our brief stop-over were *Agama* lizards and *Achatina* snails.

NCHENACHENA, SLOPES OF NYIKA MOUNTAINS. $10^{\circ}23' \text{ S.}, 33^{\circ}28' \text{ E.}$ Alt. 4600 ft.

Arrived October 22, and left on foot for Plateau on 27th. Returned on November 19, and left by lorry on the 23rd.

Weather fine except that at 6 A.M. on October 26th, following two vivid flashes of lightning, a wall of rain advanced across the plain and enveloped us in a downpour that lasted several hours.

On both occasions we stayed at a then-unoccupied brick bungalow on the mountain side above, and about a mile from the main group of Agricultural Department buildings.

Directly opposite, across the Henga Valley shimmering in a heat-haze, rose the Vipya, its summit sharply outlined against the pale blue sky. Only on one short stretch of the long skyline were any trees silhouetted; at this distance the precipitous sides appeared gray-green broadly streaked with sandy brown where erosion had stripped away the last vestiges of vegetation. Below the bungalow were clumps of bananas, tung trees in bloom, and the vivid green foliage of an experimental coffee plantation showing to advantage against the rich red soil. Behind and above the bungalow were scrub-covered slopes, steep and eroded.

Though rodents were plentiful, no sooner were they trapped than they were ruined, as specimens, by the omnivorous ants that swarmed everywhere. While I was making preparations for our ascent to the plateau our boys collected some reptiles and amphibians in the vicinity of a stream that flowed nearby. In anticipation of our arrival Major D. N. Smalley, in charge of this outpost, had kindly had the path cleared all the way up the 4000-foot ascent from bungalow to plateau. Not only that, but with characteristic helpfulness he also made arrangements for the carriers necessary to transport our loads, both up and down.

NYIKA PLATEAU ABOVE NCHENACHENA. $10^{\circ}10' \text{ S.}, 33^{\circ}35' \text{ E.}$ Alt. 7500 feet.

Made camp on October 27, and returned to Nchenachena on November 19.

November is the best month in which to visit the plateau. Whyte's men suffered severely from the cold in June, for during the coldest months the temperature falls below 40° by day and frosts at night are not unusual. November is said to be the most rain-free month on the Nyika but there were two deluges during our first night (October 28) when the roar of the rain on our canvas awnings awakened us all. As dawn broke, everything outside a radius of a hundred feet was seen to be enshrouded in a driving mist, a phenomenon repeated on several successive mornings. On November 6th a blustering gale, which raged for several hours, accompanied the swirling mist. From the 14th to the 16th we were enveloped in the penetrating chill of a clammy fog that condensed in beads of moisture on one's hair and clothes; periodically there were heavy rainstorms which did appear to arouse amphibian life.

Our tents were pitched on the site prepared for Dr. Leonard J. Brass, botanist of the Vernay Expedition, who spent ten days on the plateau in August, 1946, while the hut (figured on the cover of the Journ. N. Y. Botanical Gardens for June, 1948, 49, No. 582), provided through the courtesy of Major D. N. Smalley, also served us as a cookhouse. The site, though twenty minutes walk from the nearest patch of forest, was selected on account of access to water, procurable from a tiny stream that meandered through the swampy valley immediately below the tent. A further consideration had been protection from the almost incessant high winds that periodically rise to gale force at night.

Dr. Brass is of the opinion that the greater part of the Nyika's rolling downlands were formerly forested; the pitiful remnants are now restricted to steep-sided gullies and precipitous escarpments. Deforestation is attributed to the annual firing of the grass by Apoka tribesmen who sought refuge on the plateau when their country was invaded by Angoni warriors. Today, except for a few scattered settlements on the sheltered southwestern slopes, the 900 square miles of the Nyika is uninhabited.

With one or two exceptions the amphibians and reptiles collected by Whyte on the Nyika prove to be lowland forms that must have come from the lower slopes rather than from the plateau as alleged. Of the half-dozen kinds of frogs collected by us in series, three (*Bufo t. nyikae*, *Phrynobatrachus u. nyikae* and *Arthroleptis x. nyikae*) represented undescribed forms differing consistently from their near relatives on the Uzungwe, Ukinga and Rungwe Mountains. As two of them are of non-forest species it suggests that upland meadows or marshes have long been an established feature of the Nyika landscape.

Similarly the lizards furnished three new forms (*Chamaeleo g. nyikae*, *Mabuya hildae* and *M. varia nyikae*) though the snakes (*Duberria l. shiranum* and *Psammophylax t. variabilis*) represented more widespread upland species.

Of the dozen species of birds described from the Nyika we secured topotypes of eight, among them such choice things as *Turdus o. nyikae* and *Nectarinia j. salvadorii*, both nesting; besides a series of the beautiful *N. f. cupreconitens* which was also present.

Strangely enough only four (*Rhynchocyon c. hendersoni*, *Crocidura b. nyikae*, *Otomys n. nyikae* and *Equus b. crawshayi*) of the ten mammals that have been named from the plateau, were taken during the three weeks we spent on the Nyika.

I left at 7.45 A.M. on the 19th and though I turned aside to shoot a topotypic Nyasa Dusky Flycatcher (*Alseonax a. subadustus*) at 6000 feet, and stopped to look for lizards, I was back at Nchenachena in a little more than an hour. I might add that the ascent only took me 2 hours and 10 minutes though a subsequent traveller (Van der Post, 1952, Venture to the Interior), has represented the ascent as being something formidable. The flycatcher was shot in the *Brachystegia* woodland which studded the eroded slopes at that point. On November 19th the trees, which were just breaking into leaf, were alive with cicadas shrilling in great abandon.

NCHISI MOUNTAIN, KOTAKOTA DISTRICT. 13°20' S., 34°00' E. Alt. 5000 feet.

Arrived November 25, and left on December 13.

At the time of our arrival dawn usually found the mountain enveloped in a dripping mist that terminated in a sharp shower unless burned off by the rising sun breaking through the clouds. There were, however, several delightfully sunny days; others remained heavily overcast and resulted in typical monsoon downpours. Unfortunately such storms were accompanied by a drop in temperature so that most frogs and toads, chilled through and through, remained torpid.

We occupied the old Boma (now the forestry officer's house I believe) where the Vernay party stayed in late July and early September, 1946. It is situated in a clearing surrounded by *Brachystegia* woodland at about 4500 feet, I should think, and some distance below the true forest.

Evergreen forest on Nchisi consists of several hundred acres confined to the eastern slopes of the ridge that extends along the summit. In most places it is surrounded by a belt of bracken and rank grass, in others by shrubby whose components have been identified by

Brass as *Tecoma*, *Dombeya*, *Dissotis*, *Cassia* and *Hibiscus*. Once inside the forest it is often possible to move freely among the buttress roots of the tall timber whose dominant species is *Piptadenia buchananii* according to Brass. Brass, who had not seen the Misukus, considered Nchisi showed less evidence of disturbance by man than any other forest he visited in Nyasaland. In the absence of a resident forestry officer, perhaps credit for this state of affairs should go to the lions which lie up in the forest during the hours of daylight.

During our stay on the mountain, mammals referable to a score of different species were collected, the rarest being a series of *Beamys major*. Half a dozen were arboreal types like *Paraxerus p. palliatus*, *Claviglis nanus*, *Deudromus w. whytei*, etc., but their association with primary forest may be considered somewhat fortuitous. Of the dozen species of amphibia preserved only three (*Arthroleptis boulengeri*, *A. s. whytii* and *Rana o. gribinguiensis*) occurred in the forest. The rest, without exception, were widespread savanna forms that had invaded the eroded slopes. Reptiles were almost equally disappointing, though the only sylvicoline species (*Brookesia nchisiensis*) turned out to be undescribed. Its range, however, extends northwards to Rungwe Mountain.

CHITALA RIVER, DOWA DISTRICT. 13°35' S., 34°15' E. Alt. 1982 feet.

Arrived by lorry on December 13, and left again on the 21st.

The average temperature for the district is 69°, the average annual rainfall 35 inches. Rain was essential if I was to secure the amphibia for which I had come to Chitala River, but the sandy river bed was dry and not a drop of rain fell during our stay. This was unusual, and in order that I might estimate my chances, our host, the Director of the Empire Cotton Growers' Experimental Laboratories, furnished me with the following summary:

Rain fell during or between	Number of years
November	1
December 1-7	7
December 8-14	2
December 15-21	5
December 22-28	2
December 29-31	1
Total years	18

During the week we were guests of Mr. H. C. Ducker, who graciously placed at my disposal a vacant office and its well-equipped laboratory complete with sinks and running water.

My labels read rather misleadingly "Chitala River near Salima." Salima, though Post Office for the Experimental Laboratory, is actually about twenty miles to the southeast and near to Domira Bay. My object in so labeling was to avoid all possibility of confusion with Chitala near Zomba, or a third Chitala in Chikwawa District.

The Chitala, which has a deep sandy bottom, is apt to cease flowing on the surface in late May or early June. Water, however, can usually be obtained by digging; though towards the end of the dry season in November one may have to excavate as much as ten feet deep for it. At no time does the river reach Lake Nyasa, but loses itself among the *Acacia albida* and elephant grass of the flooded flats between Domira Bay and Makanjila's Village.

It was while on the staff of the Experimental Station that Mr. B. L. Mitchell captured the frogs that were subsequently, but mistakenly, described as new by Dr. A. C. Hoffman, with type locality given as "Chitjala" (*sic*). Of these four forms I captured only topotypes of *Phrynobatrachus chitjalensis* (= *P. u. mababiensis* FitzSimons) about some stagnant pools retained among the rocks in the bed of the Chitala. From another pool, resulting from a rainstorm that occurred just before our visit, in a corner of one of the new dams constructed under Mr. Ducker's direction, a series were discovered that have been named *Phrynobatrachus duckeri*. Eleven kinds of amphibia, besides reptiles, birds and mammals, were collected during our week at the Station.

MPATANJOKA near Salima, DOWA DISTRICT.

Visited on December 15, when some collecting was accomplished.

MNEMA, MAKANJILA, LAKE NYASA.

Visited on December 16, being driven over from Chitala by Mr. Ducker. It is situated on sandy flats in an area subject to flooding.

HYNDE DAM, LIMBE, BLANTYRE DISTRICT. 15°50' S., 35°03' E. Alt. 3800 feet.

Drove over from Blantyre on December 27th and spent a few hours.

Collected frogs of several widespread forms around the margins of the shrinking dams which are situated in undulating uplands with a flora similar to that described for Blantyre.

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KASUMBADEDEZA, TETE DISTRICT. 16°07' S., 33°30' E. Alt. 250 feet.

Arrived January 5, and left by lorry on the 31st.

I am indebted to the Intendente of Tete for the information that during my stay in January, 1949, the mean temperature was 90.5°, the average maximum 104.7°, the absolute maximum 109.4° (on several days), the average minimum 71.6°, the absolute minimum 64.4°. Brief showers fell on three days and the total precipitation for the month was only 0.67 inches; the biggest fall, 0.28 inches, occurred on January 17th. At best the average annual fall at Tete is but 21.2 inches, so that the rains, which normally fall between November and March, had, up to the time of my departure, signally failed.

Camp was made beneath a great fig tree on the outskirts of Kasumbadedza, a Nyungwe village of considerable size situated on slightly rising ground about a quarter mile from the south bank of the Zambezi, at a point about five miles west of Tete; the uninviting, intervening terrain being arid and eroded.

At this low altitude the flats directly in front of my tent shimmered with heat during the noonday hours when scarcely a bird or beast was to be seen. In normal seasons these flats are intensively cultivated. Dry and dusty at the time of my visit they supported an extensive scattering of trees, chiefly acacia and a termite-resisting hardwood of moderate height. To the west an almost park-like appearance was imparted to the landscape by the many huge baobabs. Immediately behind the village the slowly rising, gravel-strewn ground was smothered by a mat of thornbush interspersed with patches of more open scrub. Solitary baobabs and trees of stunted growth projected from both. From the hills behind, broad ribbons of deep sand led down to the Zambezi; one of these dry watercourses to the east of camp passed through a rocky ravine much beloved by lizards. Another favorite collecting locality was the rocks scattered along a ridge that paralleled the Zambezi at one stretch between Kasumbadedza and Tete; they went by the name of Mwanza.

There is, of course, no evergreen forest near Tete and my purpose in visiting the place was to obtain as many topotypes as possible of the numerous vertebrates described from there about a century ago by Wilhelm Peters and others. Owing to the drought I captured representatives of only three of the eight topotypic frogs, but twenty-six of the forty reptiles and added a new one (*Pachydactylus tctensis*) to the list. With both birds and mammals I was moderately successful. An overall summary of the species obtained at Tete shows 23 (55 skins) mammals, 69 (146 skins) birds, 40 (315 alcoholics) reptiles, and 10 (291 alcoholics) frogs.

MPATAMANGA GORGE BRIDGE, BLANTYRE. 15°40' S., 34°45' E. Alt. 1000 feet.

On January 31 we paused while *en route* from Tete to Blantyre to do some lizard collecting among the rocks on high ground to the west of the road and a mile or two on the Tete side of the bridge. A new race of rock-lizard (*Platysaurus guttatus nyasae*) resulted, the first record of the occurrence of this genus north of the Zambezi.

DALLY'S HOTEL, CHIPOKA, L. NYASA. 14°20' S., 35°10' E. Alt. 1550 feet.

Spent the night of February 2 at this lakeside resort, and returned to do a little collecting in the vicinity on several occasions during the month.

CHOWE, MANGOCHIE HILLS, FORT JOHNSTON DISTRICT. Alt. 3000 feet.

On February 12 I spent the morning collecting among the rocks on the *Brachystegia*-covered hillside above Dr. W. A. Lamborn's estate. As might be supposed, the herpetofauna consisted of such common savanna species as *Philothamnus hoplogaster*, *Thelotornis k. capensis*, besides various forms of *Mabuya* and *Rana*.

We had come about 25 miles from Mtimbuka, but distances among these hills are illusive. Fort Mangoche itself, at 5,450 feet, though only 14 airline miles from Fort Johnston, is said to be 29 miles by road and paths through the hills paralleling the eastern shore of Lake Malombe.

KAUSI VILLAGE, LAKE MALOMBE. 14°40' S., 35°08' E. Alt. ca. 1500 feet.

Spent February 25th collecting in the vicinity of this fishing village, 20 miles south of Fort Johnston, on the shore of Lake Malombe (Pamalombe on many maps owing to Livingstone transcribing the prefix pa- (= at) which local natives are apt to attach to place names). Malombe is connected with Nyasa by the Shire River.

From 9 A.M. to 3 P.M., except for a forty-minute interval for lunch, I supervised digging beneath collapsed huts or under the many piles of vegetable debris in the native plots. Conditions appeared ideal, yet in six hours all we got — apart from an epauletted bat and a monitor lizard shot among the bananas — were three dozen skinks (*Riopa sundevallii*), a snake-eyed skink (*Ablepharus wahlbergii*) and two young house-snakes (*Boaedon l. lineatus*).

MTIMBUKA (TEMBUKA), LAKE NYASA. 14°18' S., 35°08' E. Alt. 1550 feet.

Arrived on afternoon of February 3, and left by lorry on March 7th.

Through the kindness of Dr. W. A. Lamborn, the medical ento-

mologist, I was privileged to occupy his house on the lake shore from which it is separated by about 30 feet of lawn. Mtimbuka is on the west side of the lake 13 miles north of Fort Johnston where temperatures ranged from 63.4° to 92.8° during our stay. The only heavy rainstorm occurred on February 4, when 1.10 inches was officially recorded at Fort Johnston. Though showers fell on 12 other days, in no instance did the precipitation exceed half an inch and the total for the 32 days was only 2.81 inches.

Rain sank quickly into the sandy ground, of which so much of the flat country surrounding Mtimbuka consisted, but was absorbed more slowly by the areas of black cotton soil where there was a tendency for marshes to form. It seems likely that these flats were formerly beneath the waters of the Lake, which is still the third largest in Africa. Apart from seasonal variations of from 3 to 6 feet due to rainfall and evaporation, there is an 11-year cycle correlated with sunspots, the water-level being highest when sunspots are most numerous and at its lowest when they are fewest.

At the water's edge were frequently extensive reedbeds or luxurious growths of sedges that sometimes covered acres; elsewhere areas of bramble and scrubby growth with here and there a great baobab. Considerable stands of wild palms (*Hyphaene*) grew from the black cotton soil but as one proceeded inland, apart from native clearings planted with maize or millet, much of the country is clothed in dense thicket growth or scattered, often stunted, xerophytic trees that extend back to the low rocky hills on the horizon.

This combination of lake and savanna environment was faithfully reflected by the 14 species of frogs and 34 of reptiles (of which 16 were snakes) taken at Mtimbuka. Mtimbuka itself does not figure in zoological literature though a few vertebrates have been described from Fort Johnston (Lesumbwe). Lake Nyasa, however, is type locality for two species of snakes (*Mehelya nyassae* and *Aparallactus guentheri*), of which we got the former. A race of gecko (*Pachydactylus c. shaughnessyi*), that I searched for in vain, also had Lake Nyasa as type locality. Subsequently (at the British Museum) I learned that one of the gecko types was from Cape Maclear from whence came several early records of reptiles which I did not encounter during the entire trip. I have since regretted that I did not visit Cape Maclear, which can be reached by boat from Monkey Bay — about forty miles north of where I was.

There was astonishingly little wild life to be seen in the savanna

at the time (February) I was there. Of the 16 species of mammals we collected, 6 were bats. These were taken as they darted to and fro along the veranda, being attracted by the clouds of lake flies which nightly swarmed about my uncurtained window in which stood a bright acetylene lamp. Lake Nyasa is type locality for at least 21 species of mollusks, a good many of which we were successful in securing.

CHOLO MOUNTAIN FOREST, CHOLO. 16°06' S., 35°03' E. Alt. 4000 feet.

Arrived March 9, and left by lorry on the 28th.

The Vernay Expedition camped here from September 18 to October 1, 1946, and two and a half years later I pitched our tents on the same site. This was just below the forest which, at this point, commences about 3600 feet and continues upwards almost to the 5000-foot summit. The site was reached by a dirt track that passes through Miangi Tea Estate.

According to the rain gauges on the Estate, during our stay rain fell on 14 days with a total precipitation of 8.2 inches, but this was in the foothills and it was undoubtedly heavier up the mountain. Though 2.18, 1.62, and 1.30 inches respectively, fell on three days, amphibians were not aroused to any appreciable extent by the downpours as the latter were invariably accompanied by a drop in temperature. Minimum temperatures at Miangi ranged from 61° (on the 26th) to 72° (11th), the maximum being 70° (15th) to 90° (11th); all unique extremes.

In the Forest Reserve are many fine trees though few have a diameter exceeding 18 inches. It is possible to walk with comfort between the great stems in the less disturbed sections. Fig and *Dracaena* appear to be the principal species, with a tendency to be smothered by epiphytic growths that provide good cover for timid monkeys. At the time of our visit the deforested slopes below 3500 feet supported a well-nigh impenetrable growth of tall grass interspersed with clumps of bushes and widely scattered umbrella acacias. The undulating foothills support extensive plantations of tea, whose flat-topped trees apparently provide congenial basking places for snakes, especially the Cape Vine-Snake (*Thelotornis k. capensis*), as it was the tea-pickers who brought in most of the 14 species of snakes we preserved at Cholo. None was encountered *within* the forest; indeed, with the possible exception of *Typhlops t. obtusus* and a *Brookesia* taken by Mitchell, none of the 36 reptiles known from Cholo is exclusively a forest form.

Of the 13 amphibia only *Scotecomorphus k. kirkii*, *Rana o. gribin-guensis*, *Arthroleptis boulengeri* and *A. s. whytii*, might be regarded as

chiefly sylvicoline. A pair of sedge-frogs (*Hyperolius p. cholocensis*) became the types of a new form, and a new race of the water-snake (*Lycodonomorphus whytii*) was first procured from a small affluent of the Nswadzi Stream that flows at the foot of the mountain.

Buccanodon beleheri, *Alcthe e. cholocensis* and *Uranomys woodi*, all have Cholo as their type locality but I failed to find them. Of the 20 species of mammals we did collect, only 4 were essentially inhabitants of primary forest.

MAGOMBE ESTATE, CHOLO DISTRICT. 16°07' S., 35°10' E. Alt. 3200 feet.

Arrived late in the afternoon of March 28, and left by lorry on the 29th.

In pouring rain we left our forest camp and drove down to Magombe Estate where I was the guest of Mr. and Mrs. A. R. Westrop, both of whom are deeply interested in natural history. It was at Magombe that Mr. Rodney C. Wood made the extensive collection of mammals that formed the basis of a report by the late P. S. Kershaw (1922, Ann. Mag. Nat. Hist. (9), 10, pp. 177-192) of the British Museum.

The little collecting we were able to accomplish in the short time at our disposal was confined to frogs and a snake.

RUO AND LUJERI RIVERS, MLANJE MOUNTAIN. 16°6' S., 35°39' E. Alt. 2350 ft.

Arrived March 29, and left by truck on April 11th.

Minimum temperatures, not quite complete, taken at Lujeri Estate during my stay, ranged from 60° to 67°, the maximum from 69° to 84°. Rain fell on 7 days with a total precipitation of 18.60 inches. Of this total 15.18 inches fell in the three day period of April 4 to 6, southeast Mlanje having the greatest rainfall in Nyasaland with about 120 inches per annum occurring on Lujeri Estate, still heavier in the forested Gorge.

As camping under such conditions might prove unpleasant, C. J. Ramsden Esq., manager of the 80,000 acre Lujeri Tea Estate, kindly placed at my disposal one of the company's houses nearest to the Gorge and scarcely a stone's throw from the gallery forest fringing the Ruu. Daily, when it was not raining, we drove up the Ruu Valley between miles of well-tended tea bushes, rich green against a background of bright red laterite soil. Eventually the narrow road, leaving all cultivation behind, became a rough track winding through dense woodland. Then we entered a gloomy clearing in which the Lujeri Estate power station was surrounded by magnificent trees. This was as far as a car might go and the only place in miles where one could be turned around. So leaving the lorry, we began to climb the path that continues all the way to the Ruu Falls at the very head of the

valley. As we toiled upwards through much beautiful, but surprisingly lifeless, evergreen forest, far below to our right we could hear the Ruu River roaring among the rocks.

Lovely as this forest is, never once did I see a monkey, mouse or squirrel along the miles covered by our several walks to and from the Falls. Possibly, with ten feet of water falling upon it annually, the Ruu Forest is too often overcast and dripping to be appreciated by animal life, for even birds were surprisingly scarce. All four kinds of mammals obtained during the week were savanna species, but as this was to be my last "camp", I had already decided to concentrate on reptiles and amphibians.

A large frog that I encountered near the foot of the Falls one day was so certainly new that I stopped to collect 30 of them which I subsequently described as *Arthroleptis a. francisci*, a southeastern race of the equatorial *A. a. adolfi-friedrici* inhabiting the Kivu and Usambara forests. Though I returned to secure more, so elusive are the factors governing their appearance that we never again found any. Apparently sunshine, accompanied by a relatively high temperature, following a brief rainstorm, provided the approved conditions.

Descending the path one day, I caught sight of a lizard slipping between the rough-hewed planks that composed a shaky, sixty-foot suspension bridge thrown across a ravine. Clearly the lizard had been basking where a shaft of sunlight fell upon the planks. That was the first glimpse I had of a flat-lizard of which we later collected a score, mostly on one sunny morning on rocks in the power station clearing. This new species (*Platysaurus mitchelli*) was the most interesting reptile I collected during the entire trip.

It was on this same path, though nearer the Falls, that Dr. A. F. Carr collected the three pygmy chameleons which were named *Brookesia p. carri*. The type and paratype of *Lycodonomorphus r. mlanjensis*, a new race of water-snake, were taken lower down the valley near the house. I might add that, together with my headman and a couple of boys, we overturned every tree or log of suitable size lying in the forest along either side of the trail. By doing so, and searching beneath, we acquired many nice snails, slugs, sow bugs, millipedes and other invertebrates, but did not see a single snake or frog.

CHIKWAWA, SHIRE RIVER. 16°03' S., 34°49' E. Alt. 400 feet.

On April 18th B. L. Mitchell, Esq., of the Tsetse Control Depart-

ment, kindly drove me down from Blantyre for a last day's collecting at an altitude lower than any I had been in, except at Kasumbadedza. The Vernay Expedition stayed at Chikwawa from October 1 to 7, 1946.

After the highlands, Chikwawa District seemed hot and dry, the fissured ground hardened by a baking sun. In some areas tall *termitaria* were quite a feature of the landscape. Sedges grew prolifically in and along the banks of the broad Shire; the extensive flats on either side were covered with rank grass. Clumps of bananas near the river provided some of the frogs of which we had come in search. Thorn-scrub, a few stunted trees, acacia, euphorbia, and a distant baobab or palm, made their contribution to this habitat.

ACKNOWLEDGEMENTS

Owing to gasoline shortages, and the near-famine conditions prevailing towards the end of my stay, much of the foregoing itinerary could not have been carried out but for the generous help and many courtesies extended to us by the Government of Nyasaland. For this I should like to thank His Excellency the Governor, and various departmental heads including Game, Forestry, Agriculture, Customs and Public Works.

Mr. W. J. Rangeley, currently Provincial Commissioner of the Southern Province and himself keenly interested in zoology, was especially helpful, as also C. D. P. T. Haskard, Esq., then District Commissioner of Chiradzulu. In the Northern Province we had the benefit of the advice of the Acting Provincial Commissioner Mr. C. W. Benson, whose knowledge of Nyasaland birds is unrivalled. Mr. B. L. Mitchell of the Game Department, one of the few who are interested in the country's reptiles, kindly supplied us with lists of the species he had encountered. The friendly assistance of Major D. N. Smalley of the Agricultural Department made it possible for us to ascend the Nyika with a minimum of delay.

Rodney Wood, Nyasaland's veteran naturalist, supplied me with much useful information prior to our arrival in the country, and his friend Mr. A. R. Westrop of Cholo generously lent us his cottage on Mlanje Plateau. Similarly Dr. W. A. Lamborn, retired medical entomologist at Fort Johnston, placed his house on the lakeshore at my disposal, and J. F. Ramsden Esq., a house on Lujeri Estate beside the Ruvo River. Indeed, the friendly residents of Nyasaland

accorded us so much assistance that it is quite impossible to mention them all by name, but I take this opportunity of offering my grateful thanks.

During my stay in Mozambique no one could have been more helpful than His Excellency Senhor Policarpo de Souza Santos and his staff. Not only did they facilitate my entrance by minimizing formalities, but rendered my stay in Tete District a very pleasant memory.

I am also indebted to the American Philosophical Society whose grant-in-aid made this expedition possible. The American Geographical Society and Dr. and Mrs. Richard Light have been most kind in allowing me to use the excellent aerial photographs on plates 2, 3, 4 and 6, which reveal so clearly the type of terrain in which we operated. Thanks go to my wife Mary for the photographs on plate 5, and to her sister, Miss Hilda Sloan, who, during the first part of the trip, so skilfully drove the four-ton truck over 2000 miles of rough roads, that there was not a single accident. Also to them both for photographs illustrating earlier reports in this series, and for much help with the collecting, particularly of mollusks on which it is hoped a report will be published in due course. A report on the earthworms is being written by Dr. A. J. Cain.

And lastly, but by no means least, I should like to thank Miss Nelda Wright for her painstaking editing of these series of reports, with consequent elimination of many errors.

CONCLUSIONS

Under no circumstances can Nyasaland be considered a zoological entity; the Protectorate is merely a fortuitous political creation resulting from conditions obtaining in 1859. The fauna of its lowland swamps and savanna is homogeneous with that of similar contiguous areas in the surrounding countries of Tanganyika, Northern Rhodesia, and Mozambique. The few endemic forms peculiar to Nyasaland are chiefly races of species occurring beyond its borders, the few whose status is at present that of full species will, in some instances, be linked with others in nearby countries. As might be expected, the animals inhabiting Nyasaland's higher mountains show relationship with forms occurring at high altitudes both to the north and to the south.

For comparative purposes I have reproduced on the accompanying

charts the records of races obtained on the three nearest mountain groups lying to the northeast, north, and northwest of Lake Nyasa, but across the border in southern Tanganyika Territory. Still other mountains will be found charted in my (Loveridge, 1933) report on the zoogeography of the Southwestern Highlands of Tanganyika.

Amphibians associated with montane meadows or *primary forests	Uzungwe Mountains							
	Ukinga & Ukena M.	Rungwe Mountain	Misuku Mountains	Nyika Plateau	Nchisi Mountain	Zomba Plateau	Cholo Mountain	Mlanje Mountain
<i>Bufo taitanus uzunguensis</i>	L	L						
<i>Bufo taitanus nyikae</i>				L				
<i>Hyperolius marginatus</i>	L	L	L	L				
<i>Hyperolius puncticulatus puncticulatus</i>			L	L	?			
<i>Hyperolius puncticulatus choloensis</i>							L	
<i>Rana fuscigula angolensis</i>	L	L	L	L	L	L	L	L
<i>Rana mascareniensis uzunguensis</i>	L	L						L
<i>Rana ansorgii</i> (occurs on Chiradzulu)								L
<i>Rana fasciata fülleborni</i>	L	L		L		M		L
* <i>Rana oxyrhynchus gribinguiensis</i>			L	L	L		L	
<i>Phrynobatrachus ukingensis mababiensis</i>	L	L			L			
* <i>Phrynobatrachus ukingensis ukingensis</i>		L	L					
<i>Phrynobatrachus ukingensis nyikae</i>				L				
* <i>Arthroleptis xenodactyloides nkukae</i>	L	L	L					
* <i>Arthroleptis xenodactyloides nyikae</i>				L				
* <i>Arthroleptis boulengeri</i> (? det.)			L		L	L	L	L
* <i>Arthroleptis reichei</i>	L	L	L	L				
* <i>Arthroleptis adolfifriedrici francei</i>								L
* <i>Arthroleptis stenodactylus whytii</i>		L	L		L		L	L
* <i>Scolecomorphus kirkii kirkii</i>		L				V	L	
*Total number of primary forest forms	2	4	4	5	2	3	4	3

L = Loveridge collected

M = Mitchell collected

V = Vernay Expedition collected

All the montane meadow frogs on the foregoing list have, with the exception of *Hyperolius marginatus*, lowland representatives. Even the small *Bufo taitanus* of the Teita Mountains in Kenya has a form *B. t. beirae* on the coastal plain away to the south. *Rana fasciata*, though exclusively montane in East Africa where, as *R. f. merumontana*, it ranges northwards to the Usambaras and Meru Mountain, is found at lower altitudes in the cooler climate of South Africa.

The only sylvicoline frogs common to both Rungwe and the Misukus are ranids with more or less well-developed digital disks, viz. *Phrynobatrachus u. ukingensis*, *Arthroleptis reichei* and *A. stenodactylus whytii*. The last mentioned (described from the Misukus by Boulenger), apparently occurring on every forested mountain from the Usambaras to Selinda Mountain in Southern Rhodesia, presents something of a problem. From its correspondingly wide-ranging lowland representative (*A. s. stenodactylus*) it differs only in having digits that terminate in disks, and on its heel a shovel-shaped metatarsal tubercle that is blunter — though adequate enough to enable its owner to bury in the softer loam or leaf mold of a primary forest. Is it possible that whenever *A. s. stenodactylus*, which inhabits the more arid lowlands, moves up to, and settles in, rain forest, that the new environment has the effect of developing disks and blunting the tubercle within a few generations? The possibility is suggested by the variability of the extensive material of both forms that is now assembled in the Museum of Comparative Zoology.

While our findings establish the close affinity of the amphibian forest faunae of Rungwe and the Misukus, there is one tiny click-frog (*Arthroleptis xenodactyloides*) I failed to find in the Misukus (though doubtless it is there), which has a representative on Rungwe, and a slightly different race in the Nyika forests to the southeast of the Misuku Mountains. The evidence seems to point to long separation of the Nyika, whose 900 square miles of undulating plateau supports a non-sylvicoline fauna strikingly reminiscent of that occurring in the Uzungwe upland meadows, though occasionally subspecifically distinct as in the case of the *Bufo*. *Arthroleptis boulengeri* was described from a single example taken in the southeast Belgian Congo and whether the frogs assigned to it here are really that species requires confirmation. The typical form of *Arthroleptis adolfifriederici* was described from Rugege Forest in the Kivu Volcanoes, ranges eastward to the Usambaras and southeast to the Porotos near Rungwe. A gap of about 700 miles separates Rungwe from Mlanje whence comes the

Reptiles associated with
montane meadows or
*primary forests

	Uzungwe Mountains	Ukinga & Ubuena M.	Rungwe Mountain	Misuku Mountains	Nyika Plateau	Nchisi Mountain	Zomba Plateau	Cholo and/or Chiradzulu	Mlanje Mountain
* <i>Lygodactylus angularis angularis</i>		L	L	L		L	L	L	L
<i>Chamaeleo goetzei goetzei</i>	L	L	L						
<i>Chamaeleo goetzei nyikae</i>					L				
* <i>Brookesia nchisiensis</i>		L	L	L		L			
* <i>Brookesia brachyura brachyura</i>							J	M	
* <i>Brookesia platyceps platyceps</i>									R
* <i>Brookesia platyceps carri</i>									V
<i>Mabuya bocagii mlanjensis</i>									L
<i>Mabuya hildae</i>					L				
<i>Mabuya varia nyikae (varia on all rest)</i>					L				
* <i>Melanoseps ater uzungwensis</i>	L								
* <i>Melanoseps ater misukuensis</i>				L					
* <i>Melanoseps ater ater (also on Vipya)</i>				L					
* <i>Holaspis guentheri laevis</i>							J		L
* <i>Typhlops tettensis obtusus</i>								L	L
* <i>Lycodonomorphus rufulus whytii (stream)</i>			B						
* <i>Lycodonomorphus rufulus mlanjensis (")</i>								L	L
<i>Pseudaspis cana</i>		L					J	J	
<i>Duberria lutrix shiranum</i>	L	L	L		L		L		V
<i>Psammophylax trimororhinus variabilis</i>	L	L	L		L		L		L
* <i>Crotaphopeltis hotamboeia tornieri</i>	L	L	L	L					
* <i>Elapsoidea sunderalli decosteri</i>				L					V
* <i>Naja melanoleuca</i>				L					V
* <i>Atheris nitschei rungwensis</i>			B	L					
*Total number of primary forest forms	2	3	4	8	0	2	2	4	8

B = Boulton collected

J = Johnston collected

L = Loveridge collected

M = Mitchell collected

R = Ramsden collected

V = Vernay Expedition &/or Carr collected

new form *A. a. francii*.

A similar case of discontinuous distribution is furnished by the limbless caecilian (*Scelcomorphus k. uluguruensis*), so abundant in the cloud forests of the Uluguru Mountains of central Tanganyika. A single example of its southern representative (*S. k. kirkii*) was unearthed, after rain, in the deforested uplands of the Ubena Highlands in southern Tanganyika. Were drought conditions the reason why we encountered none in the Misuku, Nyika, Vipya, or Nchisi Mountains? For *S. k. kirkii* occurs again on Zomba Plateau, Blantyre, and Cholo Mountain where, following heavy downpours, many of these wormlike creatures came to the surface and were captured. From Ubena to Zomba, in a straight line down Lake Nyasa, the distance is about 450 miles.

Among reptiles no difficulty arises in deciding which are montane meadow forms more or less isolated at 6000 feet or over. Three of the seven species listed are skinks (*Mabuya*) at present known only from single mountains. *M. b. mlanjensis* is related to an Angolan species; there are some grounds for thinking that *M. hildae* may be only subspecifically differentiated from a rare Ukinga Mountain skink, while *M. v. nyikae* is a montane representative of the widespread lowland *M. v. varia* which occurs as high as 6000 feet on Mlanje's Lichenya Plateau. Of the three snakes one, *Pseudaspis cana*, often lowland in South Africa, occurs unchanged in the upland zones of tropical East Africa all the way to Mount Kenya. The other two species, described from Nyasaland Mountains by Günther, have since been found on the uplands of southern Tanganyika, but further north both are replaced by other montane races ranging into the mountains of Ethiopia. In temperate South Africa, *Duberria l. lutrix* may be found at low altitudes, as also the typical *Psammophylax t. tritaeniatius* whose range extends through the hot lowlands of Nyasaland (we met with it on Nchisi) to southeastern Tanganyika Territory.

When it comes to deciding what species of reptiles are exclusively primary forest forms we face difficulties for, following deforestation, some arboreal species (e.g. *Lygodactylus a. angularis*) exhibit considerable adaptability. On Chiradzulu, for example, this gecko suns on the walls and sleeps in the thatch of the District Commissioner's house. Others like *Brookesia*, *Melanoseps* and *Typhlops t. obtusus* seem to thrive just as well under the humid conditions provided by riverine gallery forest in the plains as ever they did in their mountain habitat. The arboreal lacertid *Holaspis g. laevis*, described from the Usambara

Mountains, has been reported by Major C. J. P. Ionides as occurring on typical savanna trees in southeastern Tanganyika. Definitely a primary forest form, our Nyasaland specimen was taken on a roadside tree near the Ruw River at the foot of Mlanje Mountain; not one was seen on the mountain itself.

The two *Lycodonomorphus* snakes belong to a genus that in East Africa occurs only in mountain streams; as these so frequently issue from the montane forests, *Lycodonomorphus* is listed, though admittedly an aquatic rather than a sylvicoline form. More interesting because neither of them have been taken in Nyasaland before, and one represents a genus new to the Protectorate, were *Crotaphopeltis h. tornieri* and *Atheris n. rungweensis* which now reach their most southerly recorded limits in the Misukus. *Brookesia nchisiensis*, on the other hand, continues southwards to Nchisi Mountain where there is an apparent break with the sylvicoline fauna of the more southerly mountains where *platyceps* is the undoubted representative of *nchisiensis*.

Attention should be drawn to the fact that this difference between the forest forms, with the exception of *Lygodactylus*, does not apply to the montane meadow snakes which, undifferentiated, range all the way from the Uzungwe south to Mlanje, an airline distance of 500 miles.

Sylvicoline mammals, being warm-blooded are better able to withstand climatic changes than the poikilothermous vertebrates. Consequently, mammal ranges often extend from the montane forests along the forest-fringed rivers that go tumbling down to the plains to merge with streams from other mountains. This appears especially true of monkeys like *Cercopithecus mitis*, the thick pelts of whose many montane forms give way to sparser fur in the race established on the coastal plain. Though *C. mitis moloneyi* allegedly came from Karonga on the lake shore, it will be noted that it was based on a skin obtained from native hunters by Whyte when he was at Karonga. Mr. C. W. Benson, formerly District Commissioner at Karonga, informs me (12 vi. 53) that he has no evidence of blue monkey occurring in the Karonga Lake littoral, but suggests it may be present along the lower Songwe River. There seems a distinct possibility therefore that the type was killed on the nearby Nyika Mountains from whose Mount Waller came the type of *francescae*, now regarded as a synonym of *C. m. moloneyi*. In passing, it might be pointed out that *C. mitis*, like the elephant shrew *Rhynchocyon cirnei*, has a different subspecies

Mammals associated with
primary forests

	Uzungwe Mountains	Ukinga & Ubena M.	Rungwe Mountain	Misuku Mountains	Nyika Plateau	Vipya or Nchisi M.	Zomba Plateau	Cholo and/or Chiradzulu	Mlanje Mountain
<i>Rhynchocyon cirnei hendersoni</i>	L		L	L	*L	L			
<i>Rhynchocyon cirnei cirnei</i>								K	L
<i>Sylvisorex sorella sorella</i>				*L					
<i>Chlorotalpa stuhlmanni</i>	L	L	L						
<i>Nandinia binotata gerrardi</i>		L	L	L					
<i>Cercopithecus mitis moloneyi</i>	L	L	L	L	S				
<i>Cercopithecus mitis nyasae</i>								L	*L
<i>Colobus polykomos sharpei</i>	S	L	S						
<i>Aethosciurus byatti laetus</i>		*L							
<i>Aethosciurus lucifer</i>			L	*L					
<i>Claviglis murinus isolatus</i>	L								
<i>Claviglis murinus collaris</i>		L							
<i>Claviglis nanus</i>				L		L			
<i>Claviglis johnstoni</i>				L			*L		
<i>Dendromus mesomelas nyasae</i>	L	L	L	L	*L				
<i>Dendromus whytei whytei</i>				Nr*	L	L		L	L
<i>Praomys jacksoni melanonotus</i>	L	L	L						
<i>Praomys jacksoni delectorum</i>				L					*L
<i>Hylomyscus carillus weileri</i>	L	L							
<i>Cricetomys gambianus viator</i>		?	L					L	
<i>Cephalophus harveyi harveyi</i>		R			L				
<i>Cephalophus caeruleus lugens</i>		S	L						
<i>Cephalophus caeruleus nyasae</i>					S	S			S
<i>Dendrohyrax arboreus minus</i>				Nr*					
Total forest forms	8	12	10	11	6	4	1	4	5

- K = Kershaw recorded
 L = Loveridge collected
 S = Seen by Loveridge
 * = Type Locality
 Nr* = Near Type Locality

on Cholo and Mlanje, suggesting long separation from the mountains of the northern group.

On the other hand, as a genus the *Colobus* monkey reaches its southeastern limit on Rungwe, despite the fact that Whyte obtained the type skin across the border at Fort Hill (5000 feet), which is only ten miles or so from the denuded slopes of the Misukus. We have no evidence that its range formerly extended to the Misukus though it might have been expected to do so in common with that of the squirrel *Athosciurus lucifer*. Instead, the distribution of *Colobus* appears to parallel that of the elusive mole *Chlorotalpa*, of whose workings I saw no sign in the Misukus though it may well be surviving on some forested mountain top.

Members of the genus *Chlorotalpa* occur from the Knysna forests of South Africa to the mountains of the Uluguru, Elgon and Ruwenzori in Central Africa. The eight races of *Sylvisorex sorella* extend northwards in the east to the Ethiopian highlands, westward to the forests of Angola and the Cameroons. *Rhynchocyon c. cirnei*, first discovered at Quelimane in Mozambique, is apparently adapted to dry forest at low altitudes for we met with it among the foothills (Likabula River) of the Mlanje Massif, not on the plateau itself.

The tree civet (*Nandinia b. gerrardi*) came from the gallery forests of the Lower Shire, but other races have been described from forested areas as far north as Kaimosi, near Elgon, and the typical form from Fernando Po off the West Coast.

Like so many rodents, the dormice (*Claviglis*, regarded as only a subgenus of *Graphiurus* by some) are adaptable and can for some time survive extensive forest destruction. *C. s. collaris* should almost certainly be regarded as just another race of the South African *murinus*, but the entire genus is so much in need of revisionary study that speculations regarding distribution appear futile. It is not unusual for several species of *Dendromus* to occur in the same locality, but the two tree mice recorded here are representatives of two subgenera and quite distinct. A third species (related to *whytei*) has been described from the Nyika Plateau but was not encountered there on this occasion though it has been taken by me on Ukerewe Island in Lake Victoria where there is relatively little surviving forest.

Surprisingly enough, Miss Lawrence finds the Poroto Soft-furred Rat (*Praomys jacksoni melanotus*) is replaced in the Misuku Mountains by the Mlanje race *delectorum*, so that it should be looked for in all the intervening montane forests. It would appear that the

Climbing Rat (*Hylomyscus*) of the Kivu volcanoes stops short on the Ukinga, but its arboreal habits (cf. Allen & Loveridge, 1933, Bull. Mus. Comp. Zool., 75, p. 109) are such as to make it easily overlooked. Search should be made for it in tree tops of the Matipa Forest on the Misukus. I have always considered the Giant Rats (*Cricetomys*) as sylvicoline and the only one taken in the course of the present trip was trapped right inside Cholo Forest. This classification is not precluded by the fact that *Cricetomys* is also a streamside dweller, for gallery forest is usually present in its habitat. Doubtless a single race (*C. gambianus viator*) ranges all the way to the Ukinga Mountains, but is replaced in the Ulugurus by *C. g. osgoodi*.

The range of Harvey's Duiker (*Cephalophus h. harveyi*) is still more extensive as it continues northwards all the way to Kilimanjaro and is doubtless present in all large stands of primary forest in Nyasaland. The timid and elusive Usangu Blue Duiker (*C. caeruleus lugens*), on the other hand, has a southern race on Mlanje, but where the break occurs between the two forms I do not know for all my records were sight or sound.

If the foregoing lists emphasize anything, it is the extreme sketchiness of our data. Merely because one failed to find a particular species during three weeks — which was the average time spent on each mountain — does not justify one in assuming that the species in question is not to be found there. A more thorough search is needed and that at different seasons of the year in the case of cold-blooded creatures.

With the lists indicating what gaps require filling in, I would suggest to any resident naturalist in Nyasaland that he select a different mountain for local leave each year and experience the exhilaration of filling in the gaps in our knowledge while there is still time to do so.

At my request Mr. C. W. Benson, the acknowledged authority on Nyasaland birdlife, kindly consented to contribute the accompanying Appendix on the Avifauna associated with Montane Rain Forests in the general region under consideration.

APPENDIX

on the

AVIFAUNA ASSOCIATED WITH MONTANE RAIN FORESTS

By C. W. BENSON

The nine areas selected for the accompanying list have been chosen as those of greater importance in Nyasaland or adjacent territory.

A capital letter in the relevant column for the area indicates that the form in question has been recorded from there in one of the following sources:

- B = Benson, C. W., "A Check List of the Birds of Nyasaland (including data on ecology and breeding seasons)," to be published about August 1953 as a special issue of the Nyasaland Journal, or (in the case of Unangu, Mozambique), in *Ibis*, 1946: 240-241.
- L = Loveridge, A., 1933, *Bull. Mus. Comp. Zool.*, **75**, 1: 35-37, or Bangs and Loveridge, *Bull. Mus. Comp. Zool.*, **75**, 3: 143-221.
- V = Vincent, J., 1934, *Ibis*: 159-160.

It should be understood that some of the forms listed are by no means confined to rain forest. Thus *Pycnonotus xanthopygos layardi* occurs at the forest edge, but also in a variety of habitats throughout Nyasaland. There are doubtless a number of occurrences of forms of this type still to be added to the list. It is natural that collectors should concentrate on specialised forest forms, to the neglect of those of more general distribution. One species of the forest proper which could doubtless be added to the list is *Francolinus squamatus*, known from the Vipya Plateau, Nyasaland (race *F. s. doni*) and the Uzungwe Mountains, Tanganyika Territory (race *F. s. uzungwensis*, see Loveridge, *op. cit.*).

Forms inhabiting secondary bracken-briar growth, replacing primary forest after its destruction, are not included. Details of altitudinal distribution and ecological preference (*i.e.*, whether feeding in the canopy, mid-stratum, ground-stratum or edges of the forest), are given in my Check List (*loc. cit. supra*).

Some differences of nomenclature from the original records for Rungwe, Unangu and Namuli will be noted. These are in accordance with subsequent taxonomic research, embodied in my Check List. I also prefer Masuku for the mountains called Misuku by Loveridge.

Avifauna associated with
Montane rain forests

	Rungwe	Masuku	Nyika	Unangu	Nchisi	Mangoche	Namuli	Cholo	Mlanje
<i>Stephanoaëtus coronatus</i>	L		B				V		B
<i>Accipiter melanoleucus melanoleucus</i>							V	B	
<i>Accipiter tachiro tachiro</i>			B		B			B	B
<i>Columba arquatrix arquatrix</i>	L		B	B	B			B	B
<i>Turturoena delegorguei sharpei</i>								B	
<i>Turtur tympanistria</i>			B		B	B	V	B	B
<i>Aplopelia larvata larvata</i>	L	B	B		B	B	V	B	B
<i>Cuculus solitarius</i>		B	B		B	B		B	B
<i>Chrysococcyx cupreus cupreus</i>					B	B		B	B
<i>Tauraco livingstonii livingstonii</i>	L			B		B	V	B	B
<i>Tauraco schalowi marungensis</i>		B	B		B				
<i>Bycanistes bucinator</i>					B	B			
<i>Bycanistes brevis</i>	L	B						B	B
<i>Tockus alboterminatus geloensis</i>		B	B						
<i>Tockus alboterminatus alboterminatus</i>					B	B	V	B	B
<i>Ciccaba woodfordii woodfordii</i>		B	B		B	B	V	B	B
<i>Caprimulgus poliocephalus guttifer</i>		B	B						
<i>Apaloderma narina narina</i>					B			B	B
<i>Heterotrogon vittatum vittatum</i>	L	B	B		B		V	B	B
<i>Buccanodon leucotis leucotis</i>								B	B
<i>Buccanodon olivaceum rungweensis</i>	L	B							
<i>Buccanodon olivaceum belcheri</i>							V	B	
<i>Viridibucco simplex</i>						B			
<i>Viridibucco leucomystax</i>		B	B		B				
<i>Pogoniulus bilineatus bilineatus</i>							V	B	B
<i>Indicator variegatus</i>							V		B
<i>Indicator minor minor</i>					B		V		
<i>Indicator exilis meliphilus</i>								B	B
<i>Prodotiscus insignis zambesiae</i>					B		V	B	B
<i>Campethera caillautii fülleborni</i>								V	
<i>Campethera abingoni abingoni</i>								B	
<i>Dendropicos fuscescens camacupae</i>						B	V		
<i>Mesopicos griseocephalus ruwenzori</i>		B	B						
<i>Smithornis capensis capensis</i>					B			B	B
<i>Pseudoalcippe abyssinicus stierlingi</i>	L								
<i>Pseudoalcippe abyssinicus stictigula</i>			B	B		B			

	Rungwe	Masuku	Nyika	Unangu	Nehisi	Mangoche	Namuli	Cholo	Mlanje
<i>Illadopsis pyrrhopterus nyasae</i>			B						
<i>Illadopsis stietigula pressa</i>	L	B							
<i>Pycnonotus xanthopygos layardi</i>		B	B		B	B	V	B	B
<i>Phyllastrephus flavostriatus alfredi</i>			B		B				
<i>Phyllastrephus flavostriatus vincenti</i>							V	B	B
<i>Phyllastrephus fischeri placidus</i>	L	B	B	B	B	B	V	B	B
<i>Phyllastrephus orostruthus orostruthus</i>							V		
<i>Phyllastrephus cerviniventris</i>					B	B			
<i>Arizelocichla tephrolaema fusciceps</i>	L		B				V		B
<i>Arizelocichla milanjensis striifacies</i>	L	B	B	B	B	B		B	
<i>Arizelocichla milanjensis milanjensis</i>							V		B
<i>Arizelocichla masukuensis masukuensis</i>	L	B							
<i>Eurillas virens zombensis</i>	L	B				B	V	B	B
<i>Alseonax adustus subadustus</i>	L		B		B	B	V	B	B
<i>Alseonax cinereus cinereola</i>					B	B		B	B
<i>Dioptrornis chocolatinus nyikensis</i>	L	B	B						
<i>Batis capensis mixta</i>	L	B							
<i>Batis capensis dimorpha</i>			B		B		V	B	B
<i>Platysteira peltata peltata</i>					B	B			B
<i>Trochocercus cyanomelas bivittatus</i>									B
<i>Trochocercus albonotatus albonotatus</i>	L	B	B	B		B	V	B	B
<i>Terpsiphone viridis violacea</i>					B				
<i>Turdus olivaceus nyikae</i>	L		B						
<i>Turdus olivaceus milanjensis</i>							V	B	B
<i>Turdus gurneyi usambarae</i>		B	B						
<i>Turdus gurneyi gurneyi</i>					B	B	V	B	B
<i>Turdus fischeri belcheri</i>								B	
<i>Cossypha heuglini heuglini</i>					B	B			B
<i>Cossypha natalensis</i>					B	B		B	B
<i>Alethe choloensis choloensis</i>						B		B	B
<i>Alethe choloensis namuli</i>							V		
<i>Alethe fülleborni fülleborni</i>	L	B	B						
<i>Bessonornis anomala macleoduniei</i>	L		B						
<i>Bessonornis anomala anomala</i>									B
<i>Bessonornis anomala gurue</i>							V		
<i>Sheppardia sharpei sharpei</i>	L		B						
<i>Pogonocichla stellata orientalis</i>	L	B	B	B	B	B	V	B	B
<i>Seiurus ruficapilla johnstoni</i>	L	B	B		B	B	V	B	B

	Rungwe	Masuku	Nyika	Unangu	Nchisi	Mangoche	Namuli	Cholo	Mlanje
<i>Sathrocercus mariae usambarae</i>	L	B	B	B		B	V	B	B
<i>Sathrocercus mariae granti</i>									
<i>Apalis thoracica murina</i>	L	B							
<i>Apalis thoracica youngi</i>			B						
<i>Apalis thoracica whitei</i>					B				
<i>Apalis thoracica lynesii</i>							V		
<i>Apalis thoracica flavigularis</i>									B
<i>Apalis cinerea brunneiceps</i>	L	B							
<i>Apalis melanocephala lightoni</i>						B			
<i>Apalis melanocephala tenebricosa</i>				B			V		
<i>Apalis melanocephala fuliginosa</i>								B	B
<i>Apalis caniceps neglecta</i>					B			B	
<i>Apalis chariessa</i>								B	B
<i>Apalis bamendae strausae</i>	B								
<i>Apalis bamendae bensoni</i>		B	B		B				
<i>Apalis moreaui sousae</i>				B					
<i>Artisornis metopias altus</i>				B					
<i>Camaroptera brachyura</i>									
<i>fuggles-couchmani</i>		B							
<i>Camaroptera brachyura bororensis</i>					B	B		B	B
<i>Campephaga sulphurata</i>					B	B	V	B	
<i>Coracina caesia pura</i>	L							B	
<i>Dicrurus ludwigii ludwigii</i>	L						V	B	B
<i>Laniarius aethiopicus major</i>		B							
<i>Laniarius aethiopicus mossambicus</i>			B		B	B	V	B	B
<i>Laniarius fülleborni</i>		B	B						
<i>Dryoscopus cubla hamatus</i>		B	B		B	B		B	B
<i>Chlorophoneus olivaceus bertrandi</i>									B
<i>Chlorophoneus nigrifrons manningi</i>			B			B	V	B	B
<i>Nicator chloris gularis</i>								B	
<i>Oriolus chlorocephalus chlorocephalus</i>								B	
<i>Onychognathus walleri walleri</i>	L		B						
<i>Onychognathus tenuirostris raymondi</i>			B						
<i>Zosterops senegalensis anderssoni</i>					B	B			
<i>Zosterops virens stierlingi</i>	L	B	B				V	B	B
<i>Cinnyris mediocris fülleborni</i>	L	B							
<i>Cinnyris mediocris bensoni</i>			B	B			V		B
<i>Cyanomitra olivacea alfredi</i>					B	B	V	B	B

	Rungwe	Masuku	Nyika	Unangu	Nelisi	Mangoche	Namuli	Cholo	Mlanje
<i>Anthreptes collaris zambesiana</i>								B	B
<i>Symplectes bicolor stictifrons</i>						B	V	B	B
<i>Othyphantes stuhlmanni nyikae</i>			B						
<i>Xanthoploceus bertrandi</i>			B		B	B		B	B
<i>Amauresthes fringilloides</i>					B			B	
<i>Cryptospiza reichenovii australis</i>		B	B	B	B		V	B	B
<i>Hypargos niveoguttatus</i>						B			B
<i>Mandingoa nitidula nitidula</i>					B	B			B
<i>Linurgus olivaceus kilimensis</i>	L	B	B						

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PLATE 1

MAP SHOWING PRINCIPAL COLLECTING LOCALITIES 1948

Landing at Beira, Mozambique (17-19.vii), Loveridge proceeded by rail to Blantyre, Nyasaland (20-26.vii). Thence by truck to Likabula River (26.vii-6.viii) at foot of Mlanje Mtn., which was ascended to Lichenya Plateau (6-23.viii) with side trip to Chambe Plateau (20.viii). Thereafter Chiradzulu Mtn. (25.viii-1.ix); Zomba Plateau (1-13.ix); Dedza (13-14.ix); Kasungu Boma (14-15.ix); Mzimba Rest House (15-16.ix); Macdonald's Camp, Vipya Plateau (16-20.ix); Katumbi (20-21.ix); Chinunkha (21-22.ix); Matipa Forest, Misuku Mtns. (22.ix-18.x); Chinunkha (18-22.x); Chere River Bridge, Northern Rhodesia (22-23.x); Nchenachena (23-25.x); Nyika Plateau (27.x-19.xi); down to Nchenachena (19-23.xi); Mzimba (23-24.xi); Kasungu (24-25.xi); Nehisi Mtn. (25.xi-13.xii); Chitala River at Empire Cotton Growers' Experimental Station (13-21.xii) with side trips to Mpatanjoka near Salima (15.xii) and Mnema, Makanjila on Lake Nyasa (16.xii); Dedza (21-22.xii); Blantyre (22.xii-3.i.49) with side trips to Hynde Dam, Limbe (27.xii).

1949

Ndirandi Mtn. (1.i). On road to Tete, Mozambique (3-4.i), roadside near Micombo east of Tete (4-5.i); Kasumbadedza Village on south bank of Zambezi 5 miles west of Tete — listed and labeled as "near Tete" (5-31.i); roadside near Mpatamanga Gorge Bridge (31.i.); Blantyre (1.ii); Dally's Hotel, Chipoka, Lake Nyasa (2-3.ii); Mtimbuka as Tembuka on labels (3.ii-7.iii) with side trips to Chowe (12.ii) and Kausi Village, Lake Malombe (25.ii); Blantyre (7-9.iii); Cholo Mtn. (9-28.iii); Magombe Estate, Cholo (23-29.iii); Ruo & Lujeri Rivers, Mlanje Mtn. (29.iii-11.iv); Blantyre (11-20.iv) with side trips to Limbe (16-17.iv) and Shire River at Chikwawa (18.iv). Left Nyasaland by air (20.iv.49).